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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF:	§	
Richard Alan Haase	§	DOCKET NO.:
	§	ClearValue - 022
SERIAL NOS: 09/733,392 & 90/005,710	§	Previously 0170SS-43690 &
	§	PAT-HAASE-SL
FILED: 12/07/2000	§	
	§	GROUP ART NO: 1724
TITLE: Potable Water Treatment System and Method of Operation Thereof	§	EXAMINER: BARRY, C.

The Honorable Commissioner
of Patents & Trademarks
Washington, D.C. 20231

RESPONSE TO OFFICE ACTION OF AUGUST 16, 2001

Dear Sir:

In response to the Office Action of August 16, 2001, please amend the claims as follows, with changes shown by underlining for additions and brackets for deletions, and as otherwise directed:

In the Claims:

Please DELETE Claim 9.

Please ADD The following Claim.

-- 20. The composition of claim 15 wherein the polyacrylamide is cationic or anionic. --

Please Amend the Claims as follows:

1. (Thrice Amended) A method for dewatering biological sludge that has been digested by a thermophilic digestion process comprising:

a. adding at least one polymeric quaternary ammonium compound, as a

[functionally] primary component, to the biological sludge;

b. adding at least one polyacrylamide to the biological sludge;

c. coagulating the biological sludge to form microflocs whereby said at least one polymeric quaternary ammonium compound functions as a primary component in forming microflocs; and

d. flocculating the microflocs with said at least one polyacrylamide such that the combination of the polymeric quaternary ammonium compound and of the polyacrylamide enhances dewatering of the sludge.

2. (Twice Amended) The method for dewatering biological sludge according to claim 1, wherein the polymeric quaternary ammonium compound is from the di-allyl di-methyl ammonium chloride (DADMAC) family.

3. (Twice Amended) The method for dewatering biological sludge according to claim 1, wherein the polymeric quaternary ammonium compound is from the epichlorohydrin di-methyl amine (epi-DMA) family.

4. (Amended) The method for dewatering biological sludge according to claim 1, wherein [the] said at least one polymeric quaternary ammonium compound is added directly to the sludge and, upon formation of microflocs of the sludge from [the] said at least one polymeric quaternary ammonium compound, wherein said at least one polyacrylamide is a cationic polyacrylamide and is added to form a floc that dewaters the sludge.

5. (Amended) The method for dewatering biological sludge according to claim 4, wherein the polymeric quaternary ammonium compound and the cationic polyacrylamide are in an approximately 1:1 ratio (by weight), with the cationic polyacrylamide having a higher molecular weight than the polymeric quaternary ammonium compound does.

6. (Amended) The method for dewatering biological sludge according to claim 4, wherein the ratio[s] of [the] said at least one polymeric quaternary ammonium compound with respect to [the] said at least one cationic polyacrylamide range from about 1:10 to about 20:1 (by weight).

7. (Amended) The method for dewatering biological sludge according to claim 4, wherein the polymer concentrations to solids ratio of total polymer dosage requirement in relationship to percentage of solids component of the sludge is between about 50 ppm:1 percent and about 300 ppm:1 percent.

10. (Amended) The method for dewatering biological sludge according to claim 8, wherein the polymeric quaternary ammonium compound and the anionic polyacrylamide are in an approximate 10:1 ratio (by weight), with the anionic polyacrylamide having a higher molecular weight than the polymeric quaternary ammonium compound[does].

12. (Amended) The method for dewatering biological sludge according to claim 8, wherein the ratio[s] of [the] said at least one polymeric quaternary ammonium compound to the anionic polyacrylamide range from about 1:10 to about 20:1 (by weight).

13. (Amended) The method for dewatering biological sludge according to claim 8, wherein the polymer concentration to solids ratio of total polymer dosage requirement in relationship to percentage of solids component of the sludge is between approximately 50 ppm:1 percent and approximately 300 ppm:1 percent.

15. (Thrice Amended) A composition for dewatering biological sludge that has been digested by a thermophilic digestion process according to claim 1 comprising at least one polymeric quaternary ammonium compound, as a [functionally] primary component, and polyacrylamide, said components being present in the composition in a ratio to enable the

at least one ammonium compound to function as a primary component in forming microflocs for the biological sludge and the composition to function as an agent for dewatering biological sludge from a thermophilic digestion process.

16. (Twice Amended) The method for dewatering biological sludge according to claim 1, wherein the polyacrylamide and [the] said at least one polymeric quaternary ammonium compound[s] are used in solution or in dry form.

19. (Amended) The method of claim 1[5] wherein the polyacrylamide is cationic or anionic.

SUPPORT FOR AMENDMENTS

Applicant greatly appreciates examiner's recommendations and suggested corrections to the claims. Applicant has amended the claims per the examiner's recommendations and suggestions to place the remaining claims in compliance with 35 U.S.C. § 112. Additionally, applicant has also clearly specified that the ratios claimed herein are "by weight".

REMARKS

35 U.S.C. § 103(a): Ort, Allied Colloid, Kurita and admitted prior art:

Reconsideration is respectfully requested for Claims 1-2, 3, 4-8, 10, 12-14, 16 & 19, as amended, said claims having been rejected under 35 U.S.C. §103(a) under the ***Graham v. John Deer*** factors based upon three patents, Ort U.S. Patent No. 4,040,953 ("Ord"), Allied Colloid International Application Publication No. W093/02968 ("Allied Colloid") and Kurita Japaneese application No. JP76033867B ("Kurita").

Turning to the rejections, it is first noted that when applying 35 U.S.C. §103 to reject claims, the following tenets of patent law must be adhered to:

(A) - The claimed invention must be considered as a whole;

(B) The references must be considered as a whole and must suggest the desirability and thus the obviousness of making the combination;

(C) The references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention; and

(D) Reasonable expectation of success is the standard with which obviousness is determined.

***Hodosh v. Block Drug Co., Inc.*, 786 F.2d 1136, 1143 n.5, 229 USPQ 182, 187 n.5 (Fed. Cir. 1986); MPEP, 7th Ed., Rev. 1 (2000), Section 2141, page 2100-90.** Applicant requests reconsideration of the rejection.

ORT:

Applicant objects to the examiner's comments that Ort discloses a thermophilic digestion process sludge that is thickened and dewatered by an undisclosed means. Ort clearly discloses a thickening and dewatering means "including a centrifuge, vacuum filter or pressure filter." (col 5 line 5-7). In fact, Ort does not teach or suggest the chemical dewatering of sludge, but only mechanical thickening and/or dewatering techniques. Applicant's invention claims the method for dewatering of sludge by the addition of chemicals, not mechanical dewatering techniques. The Ort patent does not even mention the effect of chemicals on the sludge to effectuate dewatering.

ALLIED COLLOID:

The aqueous suspension to which Allied Colloid's method is directed is not a biological sludge resulting from a thermophilic digestion process as claimed by applicant. Allied Colloids specifically describes a method to be applied to sedimentation processes (Page 3 line 5-6) , and fails to describe thermophilic digestion which is a biological process during which the bacteria from the treatement system are consumed by other bacteria or by each other as per applicant's invention. In

fact, Allied Colloid teaches a process to be used prior to biological digestion (Page 4 line 10-13). Further, Allied Colloid specifically describes that "the addition of cationic polymer is made at some position ahead of the clarifier or other sedimentation equipment and anionic colloidal material is added after the polymer addition but before the sedimentation stage, and preferably bridging flocculant is added after the anionic colloid but before sedimentation. (Page 7 line 30-35).

KURITA:

Applicant objects to the examiner's conclusion that Kurita discloses improved coagulation via a method of dewatering sludge including the combination of low molecular weight polyalkylene polyamines and a high molecular weight polyacrylamide. Kurita actually discloses a method of dewatering sludge comprising the combination of polycationic compound, a metal salt and polyacrylamide to dewater sludge. Kurita does teach or suggest the a method for dewatering sludge without the addition of metal salt. Although Kurita does disclose the combined use of polyaklylene polyamines and a polyacrylamide, a person of ordinary skill in the art could not expect the same results with such a combination without the addition of the integral metal salts taught by Kurita. Applicant does not claim the addition of any metal salts to any combination to effectuate the dewatering of sludge.

Additionally, there is no suggestion that Kurita's method could be used to effectuate dewatering in a biological sludge resulting from a thermophilic digestion process as required by applicant's invention.

'435 SPECIFICATION:

Applicant objects to the examiner's rejection of Claim 3 under 35 U.S.C. § 103(a) as obvious over the combination of Ort, Allied Colloid, Kurita (as described above), and further in view of the '435 disclosure. Examiner contends that as applicant disclosed that it was known in the art to use

either DADMAC or epi-DMA for the dewatering of sludge from the thermophilic digestion process. Examiner further proposes that it would have been obvious in view of this statement to have substituted epi-DMA for the DADMAc of Allied Colloid in that applicant admits that both compounds are polyquaternary amines. Although Allied Colloid does suggest the use of the specific polyquaternary amine DADMAC, Allied Colloid fails to teach the use of any polyquaternary amines after thermophilic digestion to effectuate the dewatering of sludge as mentioned above.

Rejection of Claims Under Section 103(a) as Unpatentable Over the Combination of Ort, Kurita, and Allied Colloid and further in View of '435 Specification

The combination of Ort, Kurita, Allied Colloid, and further in view of '435 specification does not render obvious Applicant's invention.

The Ort, Kurita, and Allied Colloid methods are actually substantially different from applicant's invention, especially as now claimed.

Applicant requests reconsideration of the Examiner's basic criteria to establish a case of prima facie obviousness because applicant believes the claims are not obvious.

Examiner states that the level of skill in the art renders Applicant's invention obvious. Specifically, Examiner stated that it would have been obvious to one of ordinary skill in the art to combine the references. However, Applicant's claims as amended are not disclosed by Ort, Kurita, and Allied Colloid, in that a combination of Ort, Kurita, and Allied Colloid does not teach each and every element of Applicant's invention as discussed herein. Therefore, Applicant respectfully requests reconsideration of the rejection.

Additionally, the analysis requires two further steps. The second step is that there must be a reasonable probability of success. There is no probability of success because Applicant's

invention is not disclosed by the combination of Ort, Kurita, and Allied Colloid.

The last criterion is that the prior art references must teach all the claim limitations. MPEP, 706.02(j). Further, "[t]he teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based upon the applicant's disclosure." ***Id, See In re Vaeck,* 947 F.2d 488 (Fed.Cir. 1991).**

There is no suggestion of success in combining the references cited. Accordingly, Applicant respectfully requests reconsideration of the rejection.

In application of all three criterion, the cited prior art references fail to establish a prima facie case of obviousness. All of the elements of Applicant's invention are not disclosed in Ort, Kurita, and Allied Colloid. Further, there is no suggestion in the independent references to combine the teachings. Nor is there any indication that the combination would be a success. Therefore, applicant requests that the rejection be removed in conformity with the case law. ***See In re Vaeck,* 947 F.2d 488 (Fed.Cir. 1991).**

Further, case law dictates removal of the rejection. The cases ***In re Jones,* 958 F.2d 347 (Fed.Cir. 1992) and *In re Fine*, 837 F.2d 1071 (Fed.Cir. 1991)** support the proposition that knowledge generally available to one of ordinary skill in the art may not be used to maintain a rejection under 35 U.S.C. §103(a). In fact, both cases reversed the Patent Office and the Board of Patent Appeals rejection of the respective claims based upon the knowledge generally available to one of ordinary skill in the art. ***In re Jones,* 958 F.2d at 351, *In re Fine,* 837 F.2d at 1075.** The "teachings of references can be combined only if there is some suggestion or incentive to do so." ***In re Fine,* 837 F.2d at 1075** (The Federal Circuit reversed the rejection because the cited prior art references contained no suggestion to combine). Therefore, the knowledge of those of ordinary skill in the art may not be used to combine references without some suggestion in the cited prior art

references themselves, especially when all the claim elements are not disclosed. It is well settled that "[B]road conclusory statements regarding the teaching of multiple references, standing alone, are not 'evidence'" of a motivation to combine those references, as would support a claim of obviousness under 35 U.S.C. §103(a). ***In re Dembiczak*, 175 F.3d 994, 999, 50 U.S.P.Q.2d 1614,1617 (Fed.Cir. 1999).** The range and/or abundance of prior art sources available, however, does not diminish the requirement for actual evidence. That is, the showing must be clear and particular. ***See, e.g., C.R. Bard, Inc. v. M3 Sys., Inc.*, 157 F.3d 1340, 1352 (Fed.Cir. 1998)** (describing "teaching or suggestion or motivation [to combine]"as an "essentiary component of an obvious holding"); ***In re Rouffet*, 149 F.3d 1350, 1359, 47 U.S.P.Q.2d 1453, 1459 (Fed.Cir. 1998).** An examiner can satisfy the burden of obviousness in light of combination "only by showing some objective teaching [leading to the combination]". ***In re Fine*, 837 F.2d 1071, 1075, 5 U.S.P.Q.2d 1596, 1600 (Fed.Cir. 1988).** Combining prior art references without evidence of such a suggestion, teaching, or motivation simply takes the inventor's disclosure as a blueprint for piecing together the prior art to defeat patentability--the essence of hindsight. ***See, e.g., Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1138, 227 U.S.P.Q. 543, 547 (Fed.Cir. 1985).** Broad conclusory statements regarding the teaching of multiple references, standing alone, are not "evidence." ***E.g., McElmurry v. Arkansas Power & Light Co.*, 995 F.2d 1576, 1578, 27 U.S.P.Q.2d 1129, 1131 (Fed.Cir. 1993).**

To point, "[a] statement that modifications of the prior art to meet the claimed invention would have been well within the ordinary skill in the art at the time the invention was made because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a prima facie case of obviousness without some objective reason to combine the teachings of the references." **MPEP 2143.01, *See Ex parte Levengood*, 28 U.S.P.Q.2d 1300 (Bd.Pat.App.&Inter. 1993).** Therefore, the mere fact that the cited prior art

references may be modified to obtain the Applicant's invention is not sufficient reason to reject the application under 35 U.S.C. §103(a) without some suggestion in the prior art references for the combination. Accordingly, because the cited prior art references contain no suggestion to modify or combine the references to arrive at Applicant's invention, the rejection should be removed. ***See Ex parte Levengood, See In re Vaeck, See In re Fine, See In re Jones.*** Accordingly, applicant respectfully requests reconsideration in light of the amendments.

The Ort, Kurita, and Allied Colloid references disclose methods that the applicant's invention could actually even operate in conjunction with, although certainly not required. The new claims are not within the scope of content of Ort, Kurita, and Allied Colloid and it should be clear that an ordinary person skilled in the art would understand the complete differences between Ort, Kurita, and Allied Colloid and the present claimed invention. Specifically, Ort discloses only a mechanical dewatering means that would actually be improved with the invention of the present application. Allied Colloid discloses the addition chemicals to aid flocculation and coagulation during settling stages prior to any sort of digestion processes. The invention of the present application would also improve the dewatering of the sludge after it has been thermophilically digested. Kurita discloses the addition of at least three chemical additives including a metal salt that is not claimed by applicant's invention. The invention of the present application effectively dewaters without the addition of metal salts as required by Kurita.

Claim 3 is also rejected under 35 U.S.C. §103(a) as being unpatentable over Ort, Kurita, and Allied Colloid as above, and further in view of the '435 specification. The '435 specification addresses the similar properties of two preferred polyquaternary amines. The '435 specification in combination with Ort, Kurita, and Allied Colloid does not address, teach or suggest the method of Applicant's invention.

102(b) ANTICIPATED: ALLIED COLLOIDS, MCGROW, OR CHUNG

Reconsideration is respectfully requested for Claims 15 and 20, as amended, said claims having been rejected under 35 U.S.C. §102(b) "Anticipation", based upon three patents, McGrow U.S. Patent No. 5,213,693 ("McGrow"), Allied Colloid International Application Publication No. W093/02968 ("Allied Colloid") or Chung U.S. Patent No. 5,601,725 ("Chung").

McGROW & CHUNG:

The suspension to which McGrow's and Chung's polymeric coagulant and flocculent is added is not a biological sludge resulting from a thermophilic digestion process, as required by claims 15 and 20. The patentee further submits that McGrow and Chung each teach coagulating with a polymeric quaternized ammonium compound prior to flocculating with a polyacrylamide in order to coagulate nonbiological solids associated with their (non thermophilically digested) sludge, whether or not the sludge had mesphilles. This is explicit in Chung and implicit in McGrow. The small margin of improvement in McGrow is evidence to such. Neither Chung nor McGrow teach or suggest the usefulness of a polymeric quaternized ammonium compound, as a primary component, to coagulate biological thermophiles.

ALLIED COLLOID:

As mentioned herein above and similarly in both Chung and McGrow, the aqueous suspension to which Allied Colloid's method is directed is not a biological sludge resulting from a thermophilic digestion process as claimed by applicant. Allied Colloids specifically describes a method to be applied to sedimentation processes (Page 3 line 5-6) , and fails to describe an application after thermophilic digestion which is a biological process during which the bacteria from the treatement system are consumed by other bacteria or by each other as per applicant's invention. In fact, Allied Colloid teaches a process to be used prior to biological digestion (Page 4 line 10-13).

Further, Allied Colloid specifically describes that "the addition of cationic polymer is made at some position ahead of the clarifier or other sedimentation equipment and anionic colloidal material is added after the polymer addition but before the sedimentation stage, and preferably bridging flocculant is added after the anionic colloid but before sedimentation. (Page 7 line 30-35).

The McGrow, Allied Colloid, and Chung refernces each describe then existing technologies which utilize traditional polyacrylamide dewatering chemistry that could not effectively or efficiently dewater sludge from a thermophilic digestion process.

The instant invention teaches away from the prior art by disclosing unexpected results associated with the use of a cationic polyacrylamide along with a poly quaternary amine to dewater sludge. Functionally speaking, applicant's invention utilizes the ammonium compound to create microflocs. The polyacrylamide amalgamates these microflocs into larger flocs for dewatering.

One discovery of Richard Haase, which forms a basis for the instant invention and is reviewed in the Haase Patent specification, was how and why thermophiles behave differently from mesophiles in dewatering biologically digested sludge.

Mesphiles naturally secrete a polysaccharide that is tackyfying. This tackifying polysaccharide produces a natural attraction between mesophilic bacteria that causes a natural coagulation and a natural formation of a microfloc.

Given the natural coagulation of mesophillically digested sludge, flocculation or bridging of the coagulated microfloc required only a high molecular weight polyacrylamide, one that is usually cationic, to create a large floc for dewatering equipment.

It was known that thermophilically digested sludge was difficult to dewater. Richard Haase believes he discovered why: e.g., thermophilic bacteria do not secrete a tackifying polysaccharide. Rather, as Richard Haase believes he discovered, thermophiles naturally repel each other.

This perceived "repulsive behavior", Richard Haase determined, was likely what was making the dewatering of thermophilic biosolids a challenge. Due to the naturally repulsive behavior of the thermophilic biosolids, dewatering typically required a significant increase in dosage of the standard polyacrylamide typically successfully used for dewatering mesophillicly digested sludge.

Haase's use of low molecular weight polyquaternary amines successfully overcoming the postulated repulsive forces of the thermophiles to form a microfloc at a cost effective dosage level.

STATUS OF THE CLAIMS:

After amendment, Claims 1-8, 10-16, and 19-20 and newly added Claim 20 are pending.

CONCLUSION

For the reasons submitted, applicant respectfully submits that the new and amended claims completely overcome the prior art of Allied Colloid, Ort, McGrow, Chung, Kurita, and the '435 specification and any other prior art cited and respectfully submits that these claims and amendments now place this application in condition for allowance. Applicant extends thanks for the Examiner's kindness and suggestions. Further, Applicant believes the application is now patentable over the cited references and that all objections and rejections have been cured.

Undersigned counsel for the applicant would welcome a telephone conference with the Examiner should that be considered helpful.

RESPECTFULLY SUBMITTED,

Date: October 16, 2001

ROBERT M. BOWICK, JR.
Reg. # 46,769
1900 West Loop South, Suite 1800
Houston, Texas 77027
(713) 355-4200 Telephone
(713) 355-9689 Facsimile

CLEAN COPY OF THE CLAIMS

1. A method for dewatering biological sludge that has been digested by a thermophilic digestion process comprising:

1. adding at least one polymeric quaternary ammonium compound, as a primary component, to the biological sludge;

2. adding at least one polyacrylamide to the biological sludge;

3. coagulating the biological sludge to form microflocs whereby said at least one polymeric quaternary ammonium compound functions as a primary component in forming microflocs; and

4. flocculating the microflocs with said at least one polyacrylamide such that the combination of the polymeric quaternary ammonium compound and of the polyacrylamide enhances dewatering of the sludge.

2. The method for dewatering biological sludge according to claim 1, wherein the polymeric quaternary ammonium compound is from the di-allyl di-methyl ammonium chloride (DADMAC) family.

3. The method for dewatering biological sludge according to claim 1, wherein the polymeric quaternary ammonium compound is from the epichlorohydrin di-methyl amine (epi-DMA) family.

4. The method for dewatering biological sludge according to claim 1, wherein said at least one polymeric quaternary ammonium compound is added directly to the sludge and, upon formation of microflocs of the sludge from said at least one polymeric quaternary ammonium compound, wherein said at least one polyacrylamide is a cationic polyacrylamide and is added to form a floc that dewaters the sludge.

5. The method for dewatering biological sludge according to claim 4, wherein the polymeric quaternary ammonium compound and the cationic polyacrylamide are in an approximately 1:1 ratio (by weight), with the cationic polyacrylamide having a higher molecular weight than the polymeric quaternary ammonium compound does.

6. The method for dewatering biological sludge according to claim 4, wherein the ratio of said at least one polymeric quaternary ammonium compound with respect to said at least one cationic polyacrylamide range from about 1:10 to about 20:1 (by weight).

7. The method for dewatering biological sludge according to claim 4, wherein the polymer concentrations to solids ratio of total polymer dosage requirement in relationship to percentage of solids component of the sludge is between about 50 ppm:1 percent and about 300 ppm:1 percent.

8. The method for dewatering biological sludge according to claim 1, wherein the polymeric quaternary ammonium compound is added directly to the sludge, in an amount sufficient to cause formation of a cationic overcharge within a developed microfloc system, and an

anionic polyacrylamide is then added for final floc formation.

10. The method for dewatering biological sludge according to claim 8, wherein the polymeric quaternary ammonium compound and the anionic polyacrylamide are in an approximate 10:1 ratio (by weight), with the anionic polyacrylamide having a higher molecular weight than the polymeric quaternary ammonium compound.

11. The method for dewatering biological sludge according to claim 10, wherein the anionic polyacrylamide is about 40% anionic.

12. The method for dewatering biological sludge according to claim 8, wherein the ratio of said at least one polymeric quaternary ammonium compound to the anionic polyacrylamide range from about 1:10 to about 20:1 (by weight).

13. The method for dewatering biological sludge according to claim 8, wherein the polymer concentration to solids ratio of total polymer dosage requirement in relationship to percentage of solids component of the sludge is between approximately 50 ppm:1 percent and approximately 300 ppm:1 percent.

14. The method for dewatering biological sludge according to claim 1, wherein the biological sludge is mixed with primary sludge.

15. A composition for dewatering biological sludge that has been digested by a thermophilic digestion process according to claim 1 comprising at least one polymeric quaternary ammonium compound, as a primary component, and polyacrylamide, said components being present in the composition in a ratio to enable the at least one ammonium compound to function as a primary component in forming microflocs for the biological sludge and the composition to function as an agent for dewatering biological sludge from a thermophilic digestion process.

16. The method for dewatering biological sludge according to claim 1, wherein the polyacrylamide and said at least one polymeric quaternary ammonium compound are used in solution or in dry form.

19. The method of claim 1 wherein the polyacrylamide is cationic or anionic.

20. The composition of claim 15 wherein the polyacrylamide is cationic or anionic.